

HERMIT CRABS (DECAPODA, ANOMURA: COENOBITIDAE,
DIOGENIDAE, PAGURIDAE) OF DARWIN AND PORT
ESSINGTON, NORTHERN AUSTRALIA

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ABSTRACT

Nineteen species of hermit crabs (families Coenobitidae, Diogenidae and Paguridae) are recorded from the terrestrial, littoral and shallow sublittoral habitats of Darwin and Port Essington, and an additional three species from other areas of the Northern Territory. Most of the species are widely distributed across the Indo-West Pacific region. Two new species, *Paguristes alegrias* and *Diogenes biramus*, are described. *Diogenes rectimanus* Miers, *D. gardineri* Alcock, *D. serenei* Forest, *Pagurus kulkarnii* Sankolli and possibly *Clibanarius longitarsus* (De Haan) are new records for mainland Australia. A key to Northern Territory hermit crabs is included.

KEYWORDS: Crustacea, Coenobitidae, Diogenidae, Paguridae, northern Australia.

INTRODUCTION

The hermit crab fauna of the Northern Territory inshore waters has not been scientifically documented. This paper concentrates on two areas of the Territory which have been relatively intensively collected: the waters adjacent to the city of Darwin, and those of Port Essington, a long (40 km), narrow (12 km) embayment 200 km northeast of Darwin. Both areas were sampled by the author in August 1986 and hermit crab specimens housed in the Northern Territory Museum also examined.

Some additional species, represented in the Museum collection by specimens from other Northern Territory localities, are briefly noted.

Northern Territory Museum registration numbers are prefixed by NTM, Western Australian Museum numbers by WAM. Unregistered material is lodged in the former institution. Specimen measurements refer to shield length and colour descriptions are based upon live material. Species of gastropod shell utilised by hermit crabs have been identified where possible and notes on habitat and recorded ranges are included.

Synonymies are not necessarily comprehensive but include reference to original descriptions, junior synonyms and some additional works which incorporate valuable descriptive material. Where listed, Alcock

Fize and Serène (1955) and Gordan (1956) may be consulted for further references.

Key to Hermit Crabs of the
Northern Territory.

1. Third maxillipeds contiguous at bases; chelae subequal or left usually larger than right 2
Third maxillipeds widely separated at bases; right chela usually larger than left Paguridae 20
2. Antennules with flagella compressed and truncate, peduncles very long; maxillipeds 1-3 with flagella reduced or absent; terrestrial
.... *Coenobita spinosus* (Coenobitidae)
Antennules with well developed flagella; maxillipeds 1-3 with well developed flagella; marine Diogenidae 3
3. Males and females with 1 or 2 pairs of modified pleopods 4
Paired pleopods absent 5
4. Males with two pairs of modified pleopods; gonopores on both sides in both sexes; shield black and white with medial orange stripe
..... *Paguristes alegrias*
Males with first pleopods paired but left pleopod much reduced (or absent), second pleopod and gonopore on right side only; females with single pair of

- pleopods, gonopore on left side only; shield cream with brown mottling
 *Paguristes monoporus*
5. Cheliped fingers moving horizontally; chelipeds subequal *Clibanarius* 6
 Cheliped fingers moving obliquely ... 9
6. Pereiopods 2 and 3 uniformly coloured green or brown except for dark annulus at distal edge of propodus, and dactyl cream (sometimes with darker patches mid-dorsally and mid-ventrally)
 *Clibanarius virescens*
 Pereiopods 2 and 3 distinctly striped longitudinally 7
7. Ocular peduncles lacking distinct striping; antennal acicle not reaching base of terminal peduncular segment
 *Clibanarius longitarsus*
 Ocular peduncles longitudinally striped; antennal acicle reaching or overreaching base of terminal peduncular segment . 8
8. Merus of chelipeds with large blunt proximoventral spine; ocular peduncles shorter than antennular peduncles; shield lacking distinct blue-green bands *Clibanarius infraspinus*
 Merus of chelipeds lacking large proximoventral spine; ocular peduncles as long as or longer than antennular peduncles; shield with 2 broad longitudinal submedial blue-green bands and narrower, darker lateral bands
 *Clibanarius taeniatus*
9. Moveable rostral scale or spine, sometimes very small or obsolete, between ocular peduncles; fingertips calcareous *Diogenes* 10
 No moveable rostral scale; fingertips corneous *Dardanus* 16
10. Rostral scale as long as or longer than half length of ocular acicles 11
 Rostral scale small, much shorter than half length of ocular acicles or obsolete 15
11. Ocular peduncles shorter than antennal peduncles 12
 Ocular peduncles longer than antennal peduncles 13
12. Left chela with small tubercles but lacking large sharp spines along ventral margin and proximolaterally; left chela with incomplete lateral ridge of small spines and tubercles strongest proximally, and, on large males, cheliped very elongate with fixed finger strongly deflexed
 *Diogenes avarus*
 Left chela with row of sharp spines projecting almost laterally from ventral margin, and several large spines proximolaterally; chela with dorsolateral ridge of distinct spines; on large specimens, left chela broad and laterally compressed with fixed finger only weakly deflexed *Diogenes rectimanus*
13. Ocular peduncles shorter than antennular peduncles; ocular peduncles with faint dorsolateral and dorsomesial longitudinal grey-green stripes
 *Diogenes gardineri*
 Ocular peduncles longer than antennular peduncles; ocular peduncles lacking longitudinal stripes 14
14. Male pleopods uniramous; shield very spinose laterally; ocular peduncles cream with brown mottling and brown band proximal to cornea
 *Diogenes serenei*
 Male pleopods biramous; shield almost smooth laterally; ocular peduncles cream, lacking mottling
 *Diogenes biramus*
15. Dactyl and propodus of left pereopod 3 not laterally flattened, lacking dorsal and ventral fringes of setae
 *Diogenes jousseanmei*
 Dactyl and propodus of left pereopod 3 laterally flattened, with dorsal and ventral fringes of setae *Diogenes* sp. A
16. Cornea occupying less than one-third of ocular peduncles 17
 Cornea occupying one-third of ocular peduncles 18
17. Lateral surface of dactyl and propodus of third left pereopod with regular transverse squamiform markings; short setae on lateral surface of chelae
 *Dardanus setifer*
 Lateral surface of third left pereopod lacking distinct squamiform markings; long setae on lateral surface of chelae .
 *Dardanus lagopodes*
18. Chelipeds similarly sized, with numerous sharp corneous spines on dorsal and lateral surfaces *Dardanus hessii**
 Left cheliped much larger than right and not ornamented with long spines ... 19

19. Dorsolateral surface of left chela with rows of blunt spines or tubercles, ventrolateral surface rather smooth
..... *Dardanus pedunculatus**
Lateral surface of left chela with imbricating squamiform tubercles
..... *Dardanus imbricatus**
 20. Sexual tube absent in males, right cheliped much larger than left
..... *Pagurus* 21
Males with long spirally coiled sexual tube on coxa of left fifth pereiopod, chelipeds subequal
..... *Spiropagurus spiriger**
 21. Dorsolateral surface of chelae without medial ridge; ventromesial flange on carpus and merus of right cheliped of males smooth or only slightly uneven
..... *Pagurus kulkarnii*
Dorsolateral surface of chelae with low medial ridge; ventromesial flange of right cheliped with distinct spines
..... *Pagurus* sp. A
- * Not collected during this study.

SYSTEMATICS

Family Coenobitidae

Coenobita spinosus Milne Edwards

Cenobita spinosa Milne Edwards, 1837: 242.

Coenobita olivieri Owen, 1839: 84.

Cenobita brunnea Dana, 1852: 470; 1855: Pl. 29 Fig. 10a, b.

Birgus hirsutus Hess, 1865: 36, Pl. 7 Fig. 16.

Coenobita spinosus - Ortmann 1892: 318, Pl. 12 Fig. 24; Alcock 1905: 192; McCulloch 1909: 305, Pl. 88 Fig. 1, 1a.

Coenobita spinosus var. *variabilis* McCulloch, 1909: 305, Pl. 88 Fig. 2, 2a.

Material. NORTHERN TERRITORY: ♀, 3.0 mm, Nightcliff, Darwin, littoral rock platform, 3 August 1986, WAM 121-87; 2 ♂, 10.4 mm, 5.1 mm, 4 ♀, 9.9 mm - 6.2 mm, Ludmilla Creek near mouth, Darwin, near mangroves, 3 August 1986, WAM 117-87, 118-87; ♀, 6.1 mm, Darwin, sand beach, 25 January 1983; 3 ♂, 11.0 mm, 4.8 mm, 3.6 mm, 2 ♀, 4.1 mm, 4.0 mm, Lee Point Beach, north of Darwin, 6 December 1976; 12 specs, 14.3 mm-6.8 mm, Fannie Bay, Darwin, 15 November 1965; 2 ♂, 5.0 mm, 4.4 mm, 3 ♀, 7.2 mm, 3.9 mm, 3.1 mm, Coral Bay island, Port Essington, upper littoral, sand near mangroves, 12 August 1986, WAM 126-87.

Coloration. Shield pale brown with darker areas especially laterally and anteriorly. Ocular peduncles pale to medium brown, corneas black. Antennular and antennal peduncles pale to medium brown, flagella pale brown. Chelipeds various shades of brown; dactyl and fixed finger paler near tip, tubercles pale; carpus with darker longitudinal lateral band; merus with darker areas distally. Pereiopods 2 and 3 brown with some pale areas, especially on dactyl and distally on propodus. Usually darker band longitudinally on carpus and distally on merus. Setae clear or pale yellow.

Remarks. The species was collected in shells of *Nerita lineata* Gmelin, *N. albicilla* Linnaeus, *Nerita* sp. cf. *N. polita* Linnaeus, *Naquetia capucina* (Lamarck), *Littoraria scabra* (Linnaeus), *Turbo cinereus* Born, *Monodonta labio* (Linnaeus), *Planaxis sulcatus* (Born) and several other gastropods.

The taxonomic status of this species is very uncertain. *C. spinosus* displays considerable morphological variation as noted by McCulloch (1909). Specimens in the same population show marked variation in development of the stridulatory ridge on the left cheliped, a character usually employed in diagnosis of species of *Coenobita* (e.g. Alcock 1905; Yaldwyn and Wodzieki 1979). The ridge is usually best developed on small specimens of *C. spinosus*. Variation also occurs in the degree of flattening of the lateral face of the third left pereiopod and in the degree of spination and setation. McCulloch (1909) named a variety, 'variabilis', for those specimens with a stridulatory ridge and flattened third pereiopods. Sympatry of subspecies, however, is rarely tenable; the coexistence of variable forms indicates either intraspecific variation, without subspecific status, or two sympatric species. Further study of intermediate specimens between the extremes of form is necessary to resolve this conundrum.

Allowing for the above variation, most specimens of *Coenobita* from tropical Western Australia and Queensland appear conspecific with Northern Territory animals. It is possible that the nominal taxon *C. spinosus* is multispecific, but presently it seems best to assign this name to the Australian species.

Habitat. Terrestrial, usually within 100 m of the seashore, especially near mangroves.

Distribution. Eastern Africa east to Tahiti including northern Australia. As noted by

McCulloch (1909) the Sydney record of the species (as *Birgus hirsutus*) by Hess (1865) must be regarded as an error.

Family Diogenidae
***Paguristes alegrias* sp. nov.**
 (Fig. 1)

Type material. HOLOTYPE - ♂, 7.4 mm, Coral Bay, Port Essington, Northern Territory, 4-6 m, sand and coral, in *Drupella cornus* (Röding) shell, 11 August 1986, NTM Cr005256. PARATYPES - ♂, 5.9 mm, same locality as holotype, NTM Cr005257; 9 specs, 8.2 mm-4.2 mm (incl. 1 ovig. ♀), Coral Bay near headland, 3-4 m, sand and coral, 12-13 August 1986, WAM 165-87; ♂, 7.7 mm, 2 ♀, 6.1 mm (ovig.), 5.0 mm, Coral Bay Island, littoral sand and rocks, 12 August 1986, WAM 166-87.

Description. Shield (Fig. 1a) approximately one and one third times longer than broad. Anterior margin between rostrum and lateral projections concave; rostrum long and rather narrow, acute, deflexed ventrally, much exceeding lateral projections and reaching midlength of ocular acicles; lateral projections broadly triangular, with terminal spinule. Dorsal surface of shield smooth, deeply sculptured posterior to rostrum; some small spinules laterally. Setation sparse dorsally with some scattered clumps of long plumose setae; dense plumose setae laterally.

Ocular peduncles long, slender and cylindrical, length approximately equal to anterior margin of shield; peduncles distinctly inflated proximally and with long plumose setae proximodorsally. Ocular acicles simple (rarely a small mesial or midlateral spinule), mesial margins slightly convex, lateral margins concave; acicles approximate at tips, separated basally by almost basal width of one acicle.

Antennular peduncles three-quarters to five-sixths length of ocular peduncles; peduncular segments unarmed except for ventromesial spine and lateral spine on basal segment. Peduncles sparsely setose.

Antennal peduncles two-thirds to three-quarters length of ocular peduncles. Fifth (ultimate) segment unarmed; fourth segment with small distodorsal spine; third with strong distal spine; second with distolateral (often bifid) spine and distomesial spine; first

segment unarmed. Antennal acicle reaching to or distal to half length of ultimate peduncular segment; acicle with terminal spine, 2 distolateral spines and 2 proximomesial spines. Scattered simple setae on segments 5 and 4, simple and plumose setae on segments 3 and 2, dense plumose setae on acicle. Antennal flagella overreaching chelipeds and longer than carapace; flagella with scattered short simple setae.

Chelipeds (Fig. 1b, c) similar though right slightly larger and stouter than left on both sexes. Dactyl half length or slightly more than half length of propodus; cutting edge with small teeth, often one larger tooth proximally, teeth corneous distally, distalmost enlarged; dorsal surface with medial row of small spines or tubercles and dorsomesial row of larger spines, decreasing in size distally; mesial surface with two irregular rows of small spines, one dorsomesially, one ventromesially, these rows poorly developed on small specimens; ventral surface smooth. Dactyl touching fixed finger for most of length, narrow gap proximally. Fixed finger of propodus broader than dactyl; with small cutting teeth, sometimes one or more enlarged proximally, distalmost two teeth corneous; row of spines parallel with cutting edge; remainder of finger with numerous conical spines, distributed proximally over palm; ventral surface of finger with scattered corneous spinules. Propodal palm slightly broader than long; dorsal and lateral surfaces with numerous conical spines and tubercles, smaller laterally, non-spined area of variable size proximodorsally; dorsomesial margin with 3-4 large spines, several smaller spines ventral to these; ventral surface of palm with scattered corneous tipped small spines. Carpus longer than broad, shorter than merus; dorsal surface with numerous small conical spines and tubercles and shallow sulcus; dorsomesial margin with 4-5 (rarely 6) large spines; lateral and mesial surfaces with scattered small spinules. Merus laterally compressed; distal, ventromesial and ventrolateral edges with irregularly sized spines; mesial and lateral faces almost smooth with some low tubercles. Long plumose setae dense on lateral surface of fixed finger and dorsal surface of propodus, dorsal surface of carpus, ventromesial and ventrolateral edges of merus; less dense on mesial surface of dactyl; scattered setae elsewhere.

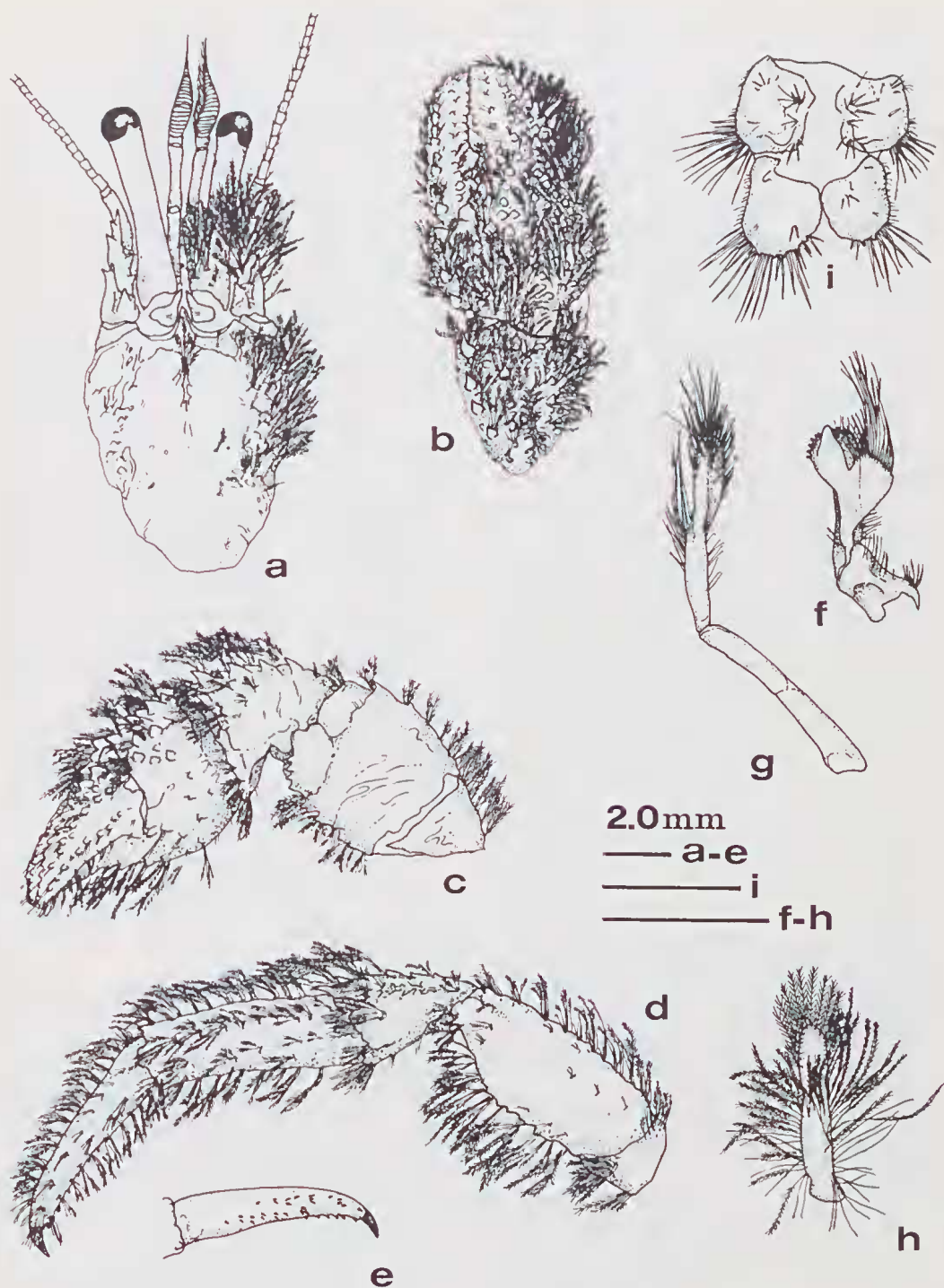


Fig. 1. *Paguristes alegrias* holotype ♂ except h: a, shield and cephalic appendages (dorsal view, setae omitted on left side); b, right cheliped (dorsal view, some setae omitted); c, right cheliped (mesial view); d, second left pereiopod (lateral view); e, dactyl of third left pereiopod (mesial view); f, left first pleopod of ♂ (lateral view); g, left second pleopod of ♂ (ventral view); h, left first pleopod of ♀ (ventral view, paratype); i, telson (dorsal view).

Second pereiopods (Fig. 1d) much longer than chelipeds. Dactyl similar length to propodus; row of corneous spines ventrally, decreasing in size proximally; no spines dorsally; strong terminal claw. Propodus unarmed except for 1 (rarely 2) distodorsal spine(s). Carpus with irregular dorsal row of spines, distalmost 1 or 2 large; lateral longitudinal sulcus. Merus very compressed laterally; dorsal margin unarmed or with slight tubercles at setal bases; ventral margin with small spines, largest distally; usually larger spine at distolateral angle. Dense long plumose setae along dorsal and ventral margins of all segments; less dense clumps of setae on lateral and mesial surface of dactyl and propodus (longitudinal row of setal clumps on lateral face of propodus) and lateral surface of carpus; mesial surfaces of carpus and merus and lateral merus with only short scattered setae.

Third pereiopods slightly longer than second, otherwise similar. Dactyl with ventral row of corneous spines, largest distally, and several longitudinal rows of small corneous spines on mesial surface (Fig. 1e). Propodus usually with several denticles or 1 spine at distodorsal angle, otherwise unarmed. Dorsal margin of carpus less spinose than on second pereiopod, merely irregular in outline except for large distal spine. Merus with 1 or 2 spines at distodorsal angle and spine at distolateral angle; ventral margin irregular or with small spines. Setation similar to that of pereiopod 2.

Sternite of third pereiopod with sharply concave anterior and lateral margins, lateral edges converging anteriorly; posterior margin shallowly concave.

First and second pleopods of male illustrated in Fig. 1f, g.

Female gonopores paired, first pleopods (Fig. 1h) paired. Brood pouch large and subquadrate.

Tailfan very asymmetrical, left uropods much larger than right. Telson (Fig. 1i) with left posterior lobe larger than right; lobes separated by deep median cleft; posterior margin of left lobe with 5 spines, of right lobe with 2 spines; lateral margins unarmed. Long simple setae on posterior margins of posterior lobes and posterolateral margins of anterior lobes; scattered long setae on dorsal surface of telson.

Coloration. Shield black with numerous irregularly sized and distributed cream or white spots and patches fusing laterally into irregular bands; bright orange medial stripe extending slightly onto thorax, some orange posterolaterally and on rostral and postorbital margins. Ocular peduncles black with white spots and white band at base of corneas; corneas black. Antennular peduncles black with white spots and patches; antennal peduncles white with irregular black patches and stripes; flagella orange. Dactyl of chelipeds black with white spines and tubercles, white areas fusing to form irregular bands. Propodus similar to dactyl, sometimes small orange patch proximoventrally. Carpus black and white, orange proximodorsally and proximomesially. Merus black and white, orange patch medially on lateral and mesial surfaces. Pereiopods 2 and 3 with irregular black and white longitudinal stripes and patches, white predominant on dactyl and propodus, black predominant on carpus and merus. Some orange tinge on propodus, distinct orange patches midlaterally and fainter mesially on carpus and merus. Pereiopods 4 and 5 black and white with some orange patches. Setae grey, obscuring some coloration on chelipeds.

Etymology. Named after the three-masted schooner, '*Alegrias*', from which sampling in Port Essington was undertaken.

Remarks. The species was collected from shells of *Drupella cornus* (Röding), *Turbo cinereus* Born, *Morula margariticola* (Broderip) and *Astraea rhodostoma* (Lamarek).

P. alegrias is similar to the Indo-West Pacific species *P. balanophilus* Alcock, *P. mundus* Alcock, *P. ciliatus* Heller, *P. seminudus* Stimpson, and *P. acanthomerus* Ortmann, in possessing antennal flagella longer than the carapace and antennular peduncles shorter than the ocular peduncles. *P. alegrias* possesses marginal spines on the posterior lobes of the telson and the right cheliped is slightly larger than the left. *P. seminudus*, *P. acanthomerus* and *P. balanophilus* lack posterior spines on the telson (Miyake, 1978) but the condition has not been recorded for *P. mundus* or *P. ciliatus*. The condition of the right cheliped being larger than the left is most unusual for the genus and also rare in the family Diogenidae. In the original figure of *P. mundus* (Alcock

1905: Pl. 3, Fig. 5), the right cheliped is shown as larger than the left, but the description cites the chelipeds as subequal.

Additionally, *P. balanophilus* has the carapace non-setose, chelipeds with a very short tomentum, chelae densely covered with squamiform tubercles and bifid or trifid ocular acicles. In *P. mundus*, the rostrum is broad and short, ocular acicles are illustrated (Alcock 1905: Pl. 3, Fig. 5) as multispinous, chelae are densely covered with small spines and setation is light. In *P. seminudus*, setation is also very light and ocular peduncles are only slightly longer than antennular peduncles. In *P. acanthomerus*, the merus of chelipeds bears a strong ventral spine.

Closest affinities of *P. alegrias* would appear to be with *P. ciliatus*. Heller's (1865) description is very brief and his figure inadequate to certainly identify his species. Alcock (1905) redefined *P. ciliatus* but expressed uncertainty as to whether or not he was in fact dealing with Heller's species. Heller (1865) noted *P. ciliatus* to have the carapace lightly setose laterally, pereopods 2 and 3 with only short marginal setae, dactyl and propodus of pereopods 2 and 3 with short spines on the upper edges and the left cheliped somewhat larger than the right. These characters indicate valid separation of the two species.

The colours of *P. alegrias* are vivid and eye-catching and distinctly different from those of *P. balanophilus* and *P. acanthomerus*, two of the above species for which live colours have been recorded (Miyake 1978).

Eggs carried by ovigerous females are relatively large (diameter 1.1-1.4 mm), suggesting abbreviated development as recorded for some other species of *Paguristes* (Dechanceé 1963; Morgan 1987a).

Habitat. Littoral and shallow (to 6 m) waters with substrates of sand and coral.

Distribution. Presently known only from Port Essington, Northern Territory.

Paguristes monoporus Morgan

Paguristes monoporus Morgan, 1987b.

Type material - HOLOTYPE ♂, SL 4.1 mm, CL 7.1 mm, Orontes Reef, west end, (11°04'S, 132°04'E), Port Essington, 11-12 m, in *Cronia avellana* Reeve, 1846) shell, 10 August 1986, NTM Cr004345.

PARATYPES - NORTHERN TERRITORY: ♂, SL 3.8 mm, 2 ♀, SL 3.1 mm and 2.9 mm, same locality as holotype, WAM 2240-86; 4 ♂, SL 3.4 mm - 2.9 mm, 2 ♀, SL 3.0 mm and 3.0 mm, Orontes Reef, west end, 14-17 m, in *Cronia avellana* shells, 9 August 1986, WAM 2241-86; 3 ♂, SL 3.8 mm, 3.1 mm, 2.9 mm, 3 ♀, SL 3.9 mm, 3.5 mm, 3.3 mm, Orontes Reef, west end, 12 m, in *Cronia avellana* and *Peristernia incarnata* (DeShayes, 1830) shells, 13 August 1986, WAM 2242-86; ♂, SL 3.5 mm, 2 ♀, SL 3.6 mm (ovig.) and 3.0 mm, Coral Bay, (11°11'S, 132°03'E), sand and coral, 4-6 m, in *Cronia avellana* shells, 11 August 1986, WAM 2243-86; 2 ♂, SL 3.4 mm and 3.3 mm, ♀, SL 3.4 mm, Coral Bay near headland, 4 m, in *Cerithium* sp. shells, 12-13 August 1986, NTM Cr004346; ♀, SL 3.7 mm, Coral Bay, on small island, sand and rocks, littoral, 12 August 1986, WAM 2244-86.

Remarks. Coloration and relationships of this aberrant species of *Paguristes* are discussed by Morgan (1987b). The species is characterised by the presence of the male gonopore and second pleopod on the right side only. This condition is remarkable both for the genus *Paguristes* and for the family Diogenidae.

Clibanarius virescens (Krauss)

Pagurus virescens Krauss, 1843: 56, Pl. 4 Fig. 3.

Clibanarius virescens Dana, 1852: 466; Dana 1855: Pl. 29 Fig. 6 a, b; Alcock 1905: 159; Grant and McCulloch 1906: 34; McCulloch, 1913: 346, Pl. 11 Fig. 2; Barnard 1950: 435, Fig. 80 b, c; Fize and Serène 1955: 138, Fig. 21; Gordan 1956: 310; Lewinsohn 1969: 26; Lec 1969: 43.

Material. NORTHERN TERRITORY: ♂, 6.7 mm, ♀, 3.4 mm, Nightcliff, Darwin, littoral, rock platform, 3 August 1986, WAM 129-87; 19 specs, 7.8 mm-2.3 mm, Table Head, Port Essington, littoral, rock platform, 8 August 1986, WAM 151-87.

Coloration. Shield green with darker brown-green anterolateral patches. Ocular peduncles orange and green with fine white band at base of corneas. Antennular peduncles green or green-blue, flagella orange. Antennal peduncles green, flagella blue. Dactyl of cheliped cream or pale yellow distally, some green or brown proximally;

spines cream. Propodus with fixed finger similar to dactyl, palm green-brown with some red-brown patches; spines cream. Carpus and merus green-brown with cream tubercles and spines. Pereiopods 2 and 3 with dactyl cream, sometimes with dark green, blue-green or brown patches dorsally or ventrally at midlength, patches sometimes fusing to form an irregular annulus. Propodus, carpus and merus green, green-blue or brown, propodus with darker patch at distal edge. Pereiopods 4 and 5 green and cream. Setae yellow.

Remarks. *C. virescens* was collected in shells of *Thais kieneri* (Deshayes), *Turbo cinereus* Born, *T. foliaceus* Philippi, *Trochus* sp. cf. *T. hanleyanus* Reeve, *Polinices tumidus* (Swainson), *Clypeomorus* sp. and others.

Colour variation in this species is quite marked. Background coloration can be olive green, green/blue or brown. The dactylar annulus on pereiopods 2 and 3 may be present, absent or incomplete.

Habitat. Collected from littoral rocky platforms.

Distribution. Eastern Africa, across Indian Ocean to northern Australia, east to Fiji Islands.

Clibanarius longitarsus (De Haan)

Pagurus longitarsus De Haan, 1849: 211, Pl. 50 Fig. 3.

Clibanarius longitarsis - Dana 1852: 464; Alcock 1905: 158.

Pagurus (Clibanarius) longitarsis - Hilgendorf 1869: 96.

Clibanarius longitarsus - De Man 1902: 741; Barnard 1950: 434; Fize and Serène 1955: 83, Fig. 11, Pl. 3 Figs 1, 7, 10, 13; Gordan 1956: 309; Lee 1969: 44; Lewinsohn 1969: 18; Khan and Natarajan 1984: 8, Fig. 6.

Material. NORTHERN TERRITORY: ♂, 5.9 mm, 3 ♀, 8.1 mm, 5.3 mm, 4.4 mm, Rapid Creek near Trower Road, Darwin, mangroves, mud and rocks, 3 August 1986, WAM 132-87; 13 specs, 8.9 mm-1.7 mm, Ludmilla Creek near mouth, Darwin, in and near mangroves, 3 August 1986, WAM 131-87; 3 ♂, 6.6 mm, 4.2 mm, 3.8 mm, ♀, 4.4 mm, Ludmilla Creek, lower littoral, mangroves, mud, 1982, NTM Cr000382; ♀, 4.9 mm, Ludmilla Creek, 7 April 1976; ♀, 4.7 mm, Ludmilla Creek, low water spring, mangrove channel, 16 February 1987, NTM

Cr004710; 2 ♂, 8.7 mm, 8.4 mm, Ludmilla Creek mouth littoral, 11 December 1974; ♂, 8.1 mm, 2 ♀, 8.9 mm, 8.5 mm, Caiman Creek, sandflat, 12 September 1985; ♂, 5.3 mm, ♀, 4.9 mm, Hope Inlet, Shoal Bay, littoral, trawl, 10 April 1975; 6 ♂, 5.9 mm-4.6 mm, 3 ♀, 7.5 mm, 7.4 mm, 5.5 mm, Hope Inlet, Shoal Bay, littoral, trawl, 14 April 1986; ♀, 5.7 mm, Hope Inlet, Shoal Bay, 17 December 1974; ♀, 9.3 mm, False Creek Point, Shoal Bay, littoral, 28 February 1975; ♂, 8.0 mm, Elizabeth Bay, 3 April 1975, NTM Cr002148; ♂, 9.2 mm, Casuarina Beach, Darwin, shore pool, 28 November 1981; ♂, 12.2 mm, Buffalo Creek, Darwin, 9 June 1972; 4 ♂, 6.6 mm-3.1 mm, 2 ♀, 4.5 mm, 4.0 mm, Coral Bay island, Port Essington, mangroves, sand, 12 August 1986, WAM 133-87.

Coloration. Shield green-brown with darker brown mottling and patches; thorax similar, with dark submedial lines. Ocular peduncles dorsally olive green, ventrally very pale green or cream (no distinct longitudinal stripes). Antennular peduncles green or blue-green, darker on lateral and mesial surfaces; flagella orange or pale brown. Antennal peduncles olive-brown, ultimate segment with dorsal and ventral cream stripes; flagella green-brown, darker laterally and mesially. Chelipeds olive or brown with irregular rows of paler, blue or blue-green tubercles and spines, many with corneous tips on dactyl and propodus. Pereiopods 2 and 3 with dactyl and propodus blue-green with two longitudinal olive or brown stripes on lateral and mesial surfaces, propodus also with fainter dorsal brown line; carpus similarly coloured to propodus except mesial lines diffuse; merus green dorsally and blue or blue-green ventrally, with broad dorsal, lateral and ventrolateral olive-brown stripes. Pereiopods 4 and 5 blue-green with dark brown or green mottling. Setae pale yellow.

Remarks. The species was collected from shells of *Telescopium telescopium* (Linnaeus), *Terebralia palustris* (Linnaeus), *Turritella terebra* (Linnaeus), *Nerita lineata* (Gmelin), *Nerita undata* Linnaeus and *Rhinoclavis vertagus* (Linnaeus).

C. longitarsus is the most abundant hermit crab in mangrove forests of the Northern Territory. The species is either somewhat variable in colour across its large range (see below) or is a member of a species complex as

suggested by Fize and Serène (1955) and Ball and Haig (1972). Fize and Serène (1955) described two species, *Clibanarius* 1 and *Clibanarius* 2 as very similar to *C. longitarsus* but differing in coloration. The Northern Territory specimens agree well with Fize and Serène's description and illustration of *C. longitarsus*. Some specimens, particularly those from Darwin sites, display more distinct blue stripes on the carpus and merus of pereopods, approaching the coloration of *Clibanarius* 1. The ocular peduncles of all specimens appear longer than those illustrated for *Clibanarius* 2. There is individual variation in the intensity of colours both at and between Northern Territory sites and I believe the specimens to be conspecific. Further work is required to warrant recognition of several species on the basis of small colour differences and at this time, the specimens are best regarded as *C. longitarsus*.

Habitat. Littoral, frequently associated with mangroves.

Distribution. East and south Africa, east to Japan, New Guinea and the Philippines, and now from northern Australia.

Clibanarius infraspinus Hilgendorf

Pagurus (Clibanarius) infraspinus Hilgendorf, 1869: 97 (footnote).

Clibanarius infraspinus - Ortmann 1892: 290; Alcock 1905: 44; McCulloch 1913: 350, Fig. 52; Fize and Serène 1955: 77, Fig. 10; Gordan 1956: 309; Lee 1969: 41, Fig. 3; Lewinsohn 1969: 19; Khan and Natarajan 1984: 5, Fig. 3.

Material. NORTHERN TERRITORY: 2 ♀, 3.9 mm, 3.8 mm, Hope Inlet, Shoal Bay, littoral, trawl, 14 April 1976; ♀, 6.5 mm, King Creek mouth, Darwin, 11 December 1974; ♀ (ovig.), 6.2 mm, King Creek, Darwin, 9 October 1974; 1 spec., Camerons Beach, Darwin, 8 January 1976; ♂, 16.2 mm, Mickett Creek mouth, 25 November 1975, NTM Cr00263; ♂, 9.7 mm, ♀, 10.0 mm, Victoria Settlement, Port Essington, littoral, 8 August 1986, WAM 128-87.

Colouration. Shield and thorax cream or pale brown with green-grey patches and some tinges of blue-green. Ocular peduncles cream with dark green-brown dorsal, lateral and mesial longitudinal stripes. Antennular peduncles cream with green-blue stripes laterally and mesially; flagella orange. Antennal peduncles similar to antennular, flagella

pale green. Dactyl of chelipeds green-blue or brown, with irregular dorsal, dorsolateral and ventral longitudinal cream or pale blue bands joining pale tubercles and spines. Propodus of cheliped similar, though bands less distinct; finger browner; paler ventrally. Carpus and merus similar to propodus. Pereopods 2 and 3 with dactyl longitudinally banded, with 2 lateral and mesial blue-green bands bordered in brown or red; midlateral, dorsal and ventral bands of cream. Propodus similar but blue-green bands broader and ventral cream band less distinct. Carpus similar but ventral cream band obsolete. Merus of pereopod 2 with dorsal cream band and diverging distolateral band; pereopod 3 with merus bearing 2 diagonal cream bands. Pereopods 4 and 5 green-brown with blue tinges.

Remarks. The species was collected from *Syrinx aruanus* (Linnaeus) and *Pugilina cochlidium* (Linnaeus).

The Northern Territory specimens agree well with the description and figure of Fize and Serène (1955), and the figure of McCulloch (1913) of an Australian specimen. The species is readily recognised by the strong proximomesial spine on the ventral edge of the merus of the chelipeds.

Habitat. Littoral, usually associated with sand.

Distribution. From the Red Sea and east Africa across the Indian Ocean to India, Japan, Taiwan, Singapore, Philippines, Vietnam, and northern Australia. As noted by McCulloch (1913), the record of *C. infraspinus* from Sydney by Ortmann (1892) is probably inaccurate. The species is probably restricted in Australia to the tropics.

Clibanarius taeniatus (Milne Edwards)

Pagurus clibanarius - Quoy and Gaimard 1824: 529, Pl. 78 Fig. 1 (not *Clibanarius clibanarius* (Herbst, 1791)).

Pagurus taeniatus Milne Edwards, 1848: 63.

Clibanarius taeniatus - Stimpson 1858: 235; Miers 1884: 265; Alcock 1905: 158; Grant and McCulloch 1906: 34; McCulloch 1913: 349, Pl. 11 Fig. 1; Gordan 1956: 310.

Material. NORTHERN TERRITORY: 12 specs, 8.4 mm-2.3 mm, Nightcliff, Darwin, littoral, rock platform, 3 August 1986, WAM 125-87; 13 specs, 7.2 mm-2.2 mm, Lee Point, north of Darwin, littoral, rock platform, 4 August 1986, WAM 124-87; ♂, 9.7

mm, Bullocky Point, Darwin, lower littoral, sand flat pool with stones, 2 October 1981, NTM X0071; ♀, 4.7 mm, Ludmilla Creek, Darwin, low water spring, mangrove channel, 16 February 1987, NTM Cr004709; 2 ♂, 7.2 mm, 6.5 mm, Minto Head, north of Victoria Settlement, Port Essington, littoral, rocks and sand, 8 August 1986, WAM 127-87; 32 specs, 8.2 mm-2.4 mm, Coral Bay island, Port Essington, littoral, sand and rocks, 12 August 1986, WAM 126-87.

Coloration. Shield with 2 broad submedial longitudinal blue-green bands and narrower, darker (often maroon tinged) lateral bands; bands edged in dark brown or red; shield cream between bands. Thorax blue-green, paler medially. Ocular peduncles pale yellow or orange dorsally, cream ventrally, with dorsal and mesial dark green, blue or brown longitudinal stripes. Antennular peduncles blue-green with dorsal band of cream edged with brown; flagella orange. Antennal peduncles blue-green with dorsal cream band on distalmost segment; flagella pale green or orange. Chelipeds deep blue-green with tinges of brown, cream patches on spines merging to form irregular longitudinal bands; mesially and ventrally on dactyl, dorsolaterally and dorsomesially on propodus, laterally and dorsomesially on carpus, dorsally, laterally and at distal margin on merus. Pereiopods 2 and 3 deep blue-green with longitudinal cream or yellow bands edged with dark brown: dorsal, lateral and ventral cream bands on dactyl and propodus; carpus with dorsal, ventral and 2 lateral bands; merus of pereiopod 2 with dorsolateral, lateral and ventral bands, merus of pereiopod 3 with dorsal, ventral and 2 laterals. Pereiopods 4 and 5 blue-green with cream longitudinal bands. Setae pale yellow. Blue coloration paler on small animals.

Remarks. *C. taeniatus* was collected from many species of gastropod shells, of varying shapes and sizes, including *Turbo cinereus* Born, *Morula margaritcola* (Broderip), *Monodonta labio* (Linnaeus), *Cerithium novaehollandiae* A. Adams, *Clypeomorus* sp., *Rhinoclavis vertagus* (Linnaeus), *R. aspera* (Linnaeus), *Murex brevispinus* Lamarek, *Strombus urceus* Linnaeus and *Nerita albicilla* Linnaeus.

The Northern Territory specimens agree well with the figure of McCulloch (1913: Pl. 11 Fig. 1) of a specimen of *C. taeniatus* from

Cooktown, Queensland. The species is very similar to *C. padavensis* de Man. Alcock (1905) described the antennal acicle of *C. padavensis* as rarely overlapping the base of the terminal joint of the antennal peduncle; it always does so on the Northern Territory specimens. Alcock's (1905) description and figure indicate *C. padavensis* to have very few spines on chelipeds, while the specimens in question display numerous large spines. In Alcock (1905) and Barnard (1950) the dactyl of pereiopod 3 of *C. padavensis* was described and illustrated as distinctly longer than the propodus while these specimens have the dactyl subequal to propodus. Alcock and Barnard also described the carapace as uniformly coloured while the present animals have distinct blue-green bands on the shield. Ball and Haig (1972) noted that *C. padavensis* can have brown stripes on the carapace but recorded only a single stripe on the ocular peduncle. *C. eurystermus* Hilgendorf is also a similar species but differs in its very flattened carapace and widely separated coxae of pereiopods 4 and 5.

Habitat. Littoral, associated with rock platforms and rocky and sandy tidal pools.

Distribution. Northern Australia, from Shark Bay in the west to Port Hacking in the east.

Diogenes avarus Heller

Diogenes avarus Heller, 1865: 83, Pl. 7 Fig. 2; Alcock 1905: 68, Pl. 6 Fig. 6; Grant and McCulloch 1906: 35; Gordan 1956: 316; Forest 1956: 524, Figs 1-4; Lewinsohn 1969: 37, Fig. 4; Khan and Natarajan 1984: 18, Fig. 15.

Material. NORTHERN TERRITORY: 14 specs, 2.6 mm-1.2 mm, Ludmilla Creek near mouth, Darwin, near mangroves, 3 August 1986, WAM 114-87; 12 specs, 3.0 mm-1.1 mm, Lee Point, north of Darwin, littoral sand flat, 4 August 1986, WAM 115-87; ♂, 1.9 mm, Woods Inlet, Darwin, 5 m, coarse sand, 10 May 1985, NTM Cr002945; ♂, 2.0 mm, ♀ (ovig.), 1.6 mm, Ludmilla Creek, Darwin, 7 April 1986; ♂, 1.9 mm, King Creek mouth, Darwin, 11 December 1974; ♂, 2.9 mm, Shoal Bay, near Darwin, 1 August, 1973; ♂, 3.5 mm, Mickett Creek, Darwin, 28 May 1975; 1 spec. (in shell), King Creek, 18 September 1974; 4 ♂, 4.3 mm-3.2 mm, King Creek, 15 August 1972; ♂, 2.9

mm, Camerons Beach, Shoal Bay, 19 May 1976; 9 specs, 3.6 mm-1.0 mm, Hope Inlet, Shoal Bay, littoral, trawl, 25 August 1972; 13 specimens, 2.5 mm-1.2 mm, Hope Inlet, Shoal Bay, 17 December 1974; 2 ♂, 2.9 mm, 2.6 mm, Camerons Beach, Shoal Bay, 4 April 1975; 9 specs, 3.1 mm-1.7 mm, Coral Bay island, Port Essington, littoral, sand and rocks, 12 August 1986, WAM 116-87; 6 ♂, 2.4 mm-1.7 mm, Coral Bay, Port Essington, lower littoral, sand beach, 20 July 1981, NTM Cr003107.

Coloration. Shield pale grey and cream, sometimes with blue tinges. Ocular peduncles cream, sometimes with blue-green flecks basally; corneas black. Antennular peduncles cream, sometimes with green-blue spot on dorsal surface of penultimate segment near articulation with ultimate segment, and spots proximally and distally on ultimate segment; flagella cream. Antennal peduncles cream; flagella cream with narrow blue-green bands on ca. every 4th segment. Chelipeds cream with variable areas of brown especially ventrally on propodus. Pereiopods cream with some brown on propodus near midlength, and scattered brown areas on carpus and merus. Setae pale yellow.

Remarks. *D. avarus* inhabits a wide range of small gastropod shells including those of *Nassarius dorsatus* (Röding), *Nassarius* sp., *Turritella terebra* (Linnaeus), *Clypeomorus* sp., *Cerithium* sp. cf *C. tenuifilum* Sowerby, *Monilea callifera* (Lamarck), and *Duplicaria* sp.

D. avarus has been diagnosed and keyed (e.g. Alcock 1905) by the characteristically elongate and very deflexed left cheliped of large adult males. As noted and illustrated by Forest (1956), however, this cheliped is shorter, stouter and only weakly deflexed on small males and all females. Small specimens are recognisable in northern Australia by the dense small tubercles and the incomplete lateral ridge on the left cheliped, the absence of sharp spines along the ventral margin of that chela, the paucity of setae on chelipeds and the coloration. It is the most common species of *Diogenes* in the Darwin area.

Habitat. Littoral and shallow sublittoral, usually associated with sand substrate.

Distribution. East Africa and Red Sea across Indian Ocean to Malaysia, Philippines and northern Australia.

Diogenes reetimaus Miers

Diogenes rectimanus Miers, 1884: 26, Pl. 27 Fig. c; Alcock 1905: 71, Pl. 6 Fig. 8; Gordon 1956: 318; Khan and Natarajan 1984: 20, Fig. 17.

Material. NORTHERN TERRITORY: 10 specs, 4.3 mm-1.0 mm, Port Essington north end, 14-16 m, trawl, mud, 8 August 1986, WAM 141-87.

Colouration. Shield grey-brown with some green flecks and mottling. Ocular peduncles, antennules and antennae pale orange-yellow. Chelipeds with dactyl and propodus cream or pale orange with darker green-grey tubercles; carpus and merus cream with green-grey or brown tinges. Pereiopods 2 and 3 cream with yellow tinges; propodus, carpus and merus with darker green or brown patches middorsally and midventrally. Pereiopods 4 and 5 pale yellow or cream with some darker flecks. Setae yellow.

Remarks. *D. rectimanus* was collected in shells of *Turritella terebra* (Linnaeus) (often only pieces of the shell spire), *Nassarius* sp. and a small fasciolarid.

Like *D. avarus*, *D. rectimanus* has ocular peduncles shorter than the antennal peduncles. The characteristic dorsolateral spinose ridge on the left cheliped is less strongly developed on small specimens. The cheliped is laterally compressed and the ventral margin bears a strong ridge of spines, projecting almost at right angles to the external face of the chela. The specimens agree closely with the description and figure of Alcock (1905).

Habitat. Sublittoral (14-16 m), mud substrate.

Distribution. Persian Gulf across Indian Ocean to India, Malaysia and Torres Strait, now recorded from mainland Australia.

Diogenes gardineri Alcock

Diogenes gardineri Alcock, 1905: 73, Pl. 7 Fig. 3; Forest 1956: 530, Fig. 16; Lewinsohn 1969: 45.

Material. NORTHERN TERRITORY: 14 specs, 2.6 mm-1.5 mm. Nightcliff, Darwin, littoral, rock platform, 3 August 1986, WAM 148-87; 25 specs, 2.9 mm-1.1 mm, Lee Point, north of Darwin, littoral, sand flat, 4 August 1986, WAM 150-87; 18 specs, 2.6 mm-1.6 mm, Lameroo Beach, Darwin, littoral, rocks and sand, 2 August 1986, WAM

149-87; ♂, 2.7 mm, Ludmilla Creek, Darwin, low water spring, mangrove channel, 16 February 1987, NTM Cr004713; 3 ♂, 3.2 mm, 3.2 mm, 2.2 mm, 2 ♀, 2.6 mm, 2.3 mm, Minto Head, north of Victoria Settlement, Port Essington, littoral, rocks and sand, 8 August 1986, WAM 153-87; 3 ♂, 2.0 mm, 1.6 mm, 1.5 mm, ♀, 1.4 mm, Coral Bay island, Port Essington, littoral, sand and rocks, 12 August 1986, WAM 160-87.

Coloration. Shield pale grey with darker brown and green areas especially medially and laterally. Ocular peduncles cream with grey-green patch proximal to cornea and two faint grey-green dorsal longitudinal stripes; corneas black. Antennular and antennal peduncles pale green; antennular flagella orange, antennal flagella pale green-yellow. Chelipeds and pereiopods mottled brown and green-blue. Colours largely obscured by long pale yellow setae especially on legs.

Remarks. *D. gardineri* was collected in shells of *Clypeomorus batillariaeformis* Habe and Kosuge, *Clypeomorus* sp., *Morula margaritica* (Broderip), *Peristernia incarnata* (Deshayes), small *Turritella terebra* (Linnaeus) and *Cerithium* sp.

D. gardineri is a member of a small group of Indo-West Pacific species which possess antennal peduncles shorter than the ocular peduncles. The group includes *D. senex* Heller, *D. pallescens* Whitelegge, *D. serenei* Forest, *D. leptocerus* Forest and *D. capricorneus* Grant and McCulloch, together with *Diogenes biramus* described in this paper.

In particular, *D. gardineri* very closely resembles *D. senex*, as noted by Forest (1956) and Lewinsohn (1969). The similarities of this group of *Diogenes* are also discussed by Ball and Haig (1972). The specimens examined agree with Forest's (1956) description of *D. gardineri* in possessing ocular peduncles shorter than antennular peduncles, while in *D. senex* they are of similar length. The rostral spine of *D. gardineri* can display a ventral tooth (Forest 1956) which may be absent (Ball and Haig 1972), always absent on *D. senex*. Lewinsohn (1969) noted that cheliped features are almost useless in distinguishing these, and many other, *Diogenes* species. As observed by Forest (1956), the original descriptions and figures of *D. gardineri* and *D. senex* are not sufficiently detailed to definitely distinguish the species.

Habitat. Littoral, rock platforms and sand flats.

Distribution. Red Sea and east Africa, New Guinea, Tuamotu Archipelago; now recorded from northern Australia.

Diogenes serenei Forest

Diogenes serenei Forest, 1956: 530, Figs 12-15; Ball and Haig 1972: 91.

Material. NORTHERN TERRITORY: ♂, 2.8 mm, 2 ♀, 3.0 mm, 2.4 mm, Orontes Reef west end, Port Essington, 11 m, 10 August 1986, WAM 154-87; 3 ♂, 3.2 mm, 2.7 mm, 2.5 mm, ♀, 1.5 mm, Coral Bay near headland, Port Essington, 4 m, 12-13 August 1986, WAM 155-87.

Coloration. Shield cream, spotted and mottled with brown. Ocular peduncles cream or white with brown mottling and brown band one-third to one-quarter length of peduncle from distal end. Antennular and antennal peduncles cream with some brown mottling, both with dark brown band at distal edge of ultimate segments; antennular flagella cream, pale green or yellow; antennal flagella cream with faint brown band on each article. Chelipeds mottled cream and brown, spines and tubercles cream or white; merus and carpus darker than propodus, dactyl mostly cream. Pereiopods 2 and 3 mottled cream and brown; darker brown band often middorsally and dorsomesially on merus, carpus and propodus, and proximally on dactyl. Pereiopods 4 and 5 cream with some brown mottling.

Remarks. The species occurred in shells of *Thais echinata* (Blainville) and *Cerithium novaehollandiae* A. Adams.

D. serenei resembles *D. gardineri* in possessing antennal peduncles shorter than the ocular peduncles. The specimens examined here agreed well with the description of Forest (1956) and displayed the strong ventral tooth on the rostral spine. The species is very similar to *D. pallescens* (Forest 1956; Ball and Haig 1972) and on some animals the ocular acicles appeared as widely spaced as those illustrated for *D. pallescens* by Ball and Haig (1972).

Coloration of *D. serenei* was not recorded by Forest (1956) nor Ball and Haig (1972).

Habitat. Collected from sublittoral waters, associated with coral.

Distribution. West Indian Ocean, Vietnam, New Guinea and now northern Australia.

***Diogenes biramus* sp. nov.**

(Fig. 2)

Type material. HOLOTYPE - ♂, 3.1 mm, Coral Bay near headland, Port Essington, Northern Territory, 4 m, in *Rhinoclavis bituberculatum* (Sowerby) shell, 12 August 1986, WAM 156-87. PARATYPE - ♂, 2.4 mm (damaged) Coral Bay, 4-6 m, 11 August 1986, WAM 157-87.

Description. Shield (Fig. 2a) slightly longer than broad. Lateral margins slightly convex with few, scattered spines; anterior margin between rostrum and lateral projections concave. Rostrum broad and short, just exceeding lateral projections, with rounded margin. Lateral projections broadly triangular, each with two terminal spinules. Long sparse setae laterally, some short setae dorsally.

Ocular peduncles slender and cylindrical, slightly inflated proximally, and much longer than anterior margin of shield. Ocular acicles with 2-3 distolateral spines; lateral margin almost rectangular; mesial margin with projection at midlength, concave distal and proximal to this; acicles separated basally by less than width of one acicle. Intercalary rostral process slightly shorter than ocular acicles, margins slightly convex tapering to long apical spine; ventral spine absent.

Antennular peduncles reaching approximately two-thirds length of ocular peduncles; segments unarmed except for small spine at distoventral angle of proximal segment; peduncles very sparsely setose.

Antennal peduncles very short, not reaching midlength of ocular peduncles. Fifth (ultimate) segment slender, unarmed; fourth segment unarmed; third with weak distal spinule; second with distal dorsolateral and dorsomesial spines and 2 larger ventrolateral spines; first segment unarmed. Antennal acicle laterally compressed, slightly exceeding distal margin of fourth peduncular segment; acicle terminating in strong spine with another dorsal to this and strong proximolateral and proximomesial spine. Scattered long simple setae on all peduncular segments and acicle. Antennal flagella short, comprising 15 articles; setae long, simple.

Third maxilliped (Fig. 2b) with 2 strong ventrolateral spines on merus; ischium lacking crista dentata but with ventromesial spine; basis with two strong ventromesial spines.

Left cheliped of male (Fig. 2c) much larger than right. Dactyl approximately half length of propodus, stout, strongly curved, slightly crossing fixed finger at tip. Cutting teeth small, strong terminal tooth. Dorsal margin with row of strong, broad spines, largest proximally; lateral surface with irregular row of tubercles near proximodorsal margin, remainder of lateral surface with few scattered tubercles; mesial surface smooth. Fixed finger slightly narrower than dactyl with large cutting tooth slightly distal to midlength; ventral margin with irregular row of spines extending back along palm; lateral surface with scattered small tubercles; mesial surface smooth. Palm of propodus approximately as long as broad; dorsal margin with strong, curved spines, largest proximally; lateral surface with scattered tubercles and small spines and very weak ridge with slightly larger spines proximomedially; large curved spines along ventral margin; mesial surface lacking spines. Carpus slightly longer than broad, just longer than merus; dorsal margin with row of 5 spines, distal 4 of which long and curved; row of spines along distolateral margin and several spines on lateral surface; mesial surface with large projection on distodorsal margin. Merus with spinules along dorsal margin and longer spines along ventrolateral margin; lateral surface with scattered tubercles. Long simple setae scattered over all segments, especially laterally, and some plumose setae particularly on propodus; mesial surfaces of palm and carpus almost naked.

Right cheliped (Fig. 2d) less robust than left. Dactylar length more than half that of propodus; cutting teeth very small; dorsal edge with row of corneous tipped spines; lateral surface roughened, mesial surface smooth. Propodus with smooth ventral margin; dorsal margin of palm with very irregular row of small spines; lateral surface of palm almost smooth, of fixed finger with some scattered tubercles. Carpus much shorter than merus, with 3 long curved spines distally on dorsal surface and 2 spines proximal to these. Merus with long spine at distodorsal angle; row of 5 spines along ventrolateral

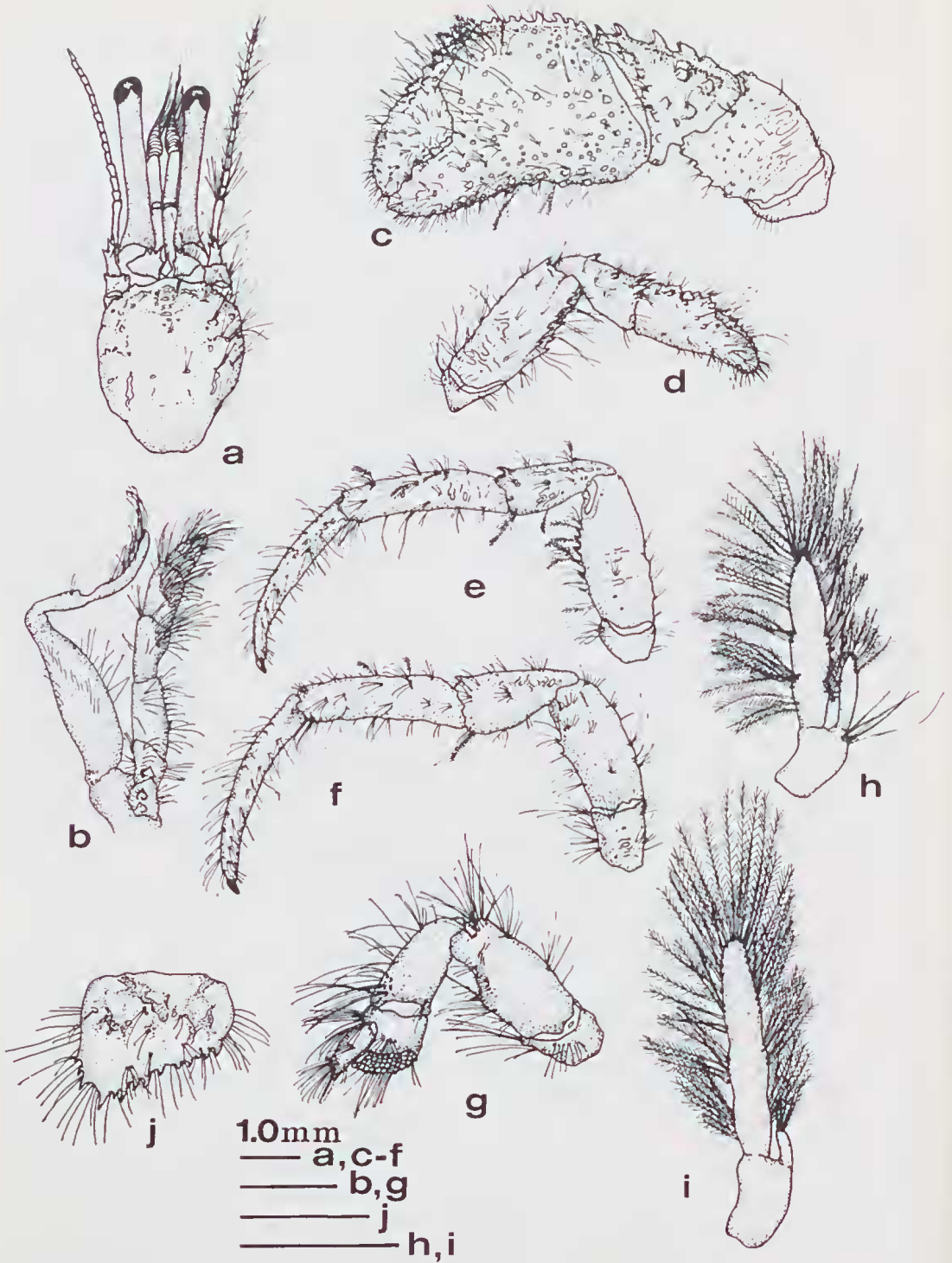


Fig. 2. *Diogenes biramus* holotype ♂: a, shield and cephalic appendages (dorsal view, setae omitted on left side); b, third maxilliped (mesial view, flagellum deflexed to avoid obscuration of endopod); c, left cheliped (lateral view); d, right cheliped (lateral view); e, second left pereopod (lateral view); f, third left pereopod (lateral view); g, fourth left pereopod (lateral view); h, first pleopod (mesial view); i, fourth pleopod (mesial view); j, telson (dorsal view).

margin, 3 spines along ventromesial margin.

Second pereopods (Fig. 2e) slightly longer than left cheliped. Dactyl slightly longer than propodus, terminating in strong claw; no spines along dorsal or ventral margins. Propodus one and a half times length of carpus; lateral surface unarmed; mesial surface with small spine distomedially and smaller spine distoventrally. Carpus two-thirds length of merus; strong spine at distodorsal angle and second spine two-thirds length of segment proximal to this. Merus laterally compressed; dorsal margin unarmed; ventral margin with row of 4-5 long curved spines. Scattered long and short simple, and some plumose, setae on all segments.

Third pereopods (Fig. 2f) slightly longer than second; propodus relatively shorter and ischium relatively longer than in second pereopods. Otherwise similar to second pereopods, except proximal dorsal spine on carpus minute or absent and only 2 spines along ventral margin of merus.

Fourth pereopods (Fig. 2g) with dactyl terminating in corneous claw. Rasp occupying less than half length of propodus. All segments lacking spines but with long simple setae.

Four unpaired biramous pleopods (Fig. 2h, i). Exopod incompletely divided into 3 lobes, and increasing slightly in size from pleopod 1 to 4. Endopod much shorter than exopod, with single lobe, decreasing in size from pleopod 1 to 4. Both rami with long, finely plumose setae. Clump of 5 long simple setae immediately proximal to base of endopod on pleopod 1; 1 seta on pleopod 2; these setae apparently absent on pleopods 3 and 4.

Tailfan very asymmetrical, left uropods much larger than right. Telson (Fig. 2j) broader than long; dorsal surface deeply sculptured; posterior margin with left side produced, lacking distinct medial cleft, armed with row of 12-13 spines; long simple setae along lateral and posterior margins and in small clumps on dorsal surface.

Coloration. Shield cream mottled with grey-green, deep green ventrolaterally. Ocular peduncles cream. Antennular peduncles cream with green tinges on penultimate segment and dark green proximal band on ultimate segment; flagella pale orange. Antennal peduncles cream, tinged with green, flagella translucent. Chelipeds cream with

faint brown or brown-green stippling; right cheliped with green patches on carpus and merus. Pereopods 2 and 3 cream with faint stippling of brown-green and darker green bands; dactyl and propodus with band at midlength and proximally; carpus with broader, fainter band at midlength; merus with diffuse green-brown patches. Pereopods 4 and 5 cream with green stippling. Setae cream.

Etymology. Named for the biramous condition of the pleopods in males.

Remarks. *D. biramus* is a member of the group of Indo-West Pacific species with ocular peduncles longer than antennal peduncles, noted in this paper under *D. gardineri*. *D. biramus* is distinctive in the extreme length of the ocular peduncles, much longer than the antennular peduncles and approximately reaching the distalmost end of the antennular flagella. The lateral margins of the shield are less spinose than those of most members of this species group.

D. biramus is unusual in its genus for the possession of biramous pleopods in the male, a character shared with *D. mercatoris* Forest. No females of *D. biramus* have been examined and hence their condition is unknown. The uniramous nature of the male pleopods has been cited as a diagnostic character of *Diogenes* (e.g. Alcock 1905) but it is possible that biramous pleopods may have been overlooked in description of some species.

Habitat. Shallow (4-6 m) sublittoral waters associated with coral reef formations.

Distribution. Presently known only from Coral Bay, Port Essington.

Diogenes jousseamei (Bouvier)

Troglopagurus jousseamei Bouvier, 1897: 231, Fig. 6; Forest 1952: 7; Lewinsohn 1969: 51.

Troglopagurus jousseaumii - Alcock 1905: 75, Pl. 5 Fig. 6; Grant and McCulloch 1906: 36; Gordan 1956: 342.

Diogenes jousseamei - Forest 1952: 9, Fig. 15.

Material. NORTHERN TERRITORY: ♂, 3.7 mm, Port Essington north end, 20 m, mud, trawl, 9-10 August 1986, WAM 145-87.

Coloration. Shield cream and pale brown with some darker brown patches. Ocular

peduncles cream with thin brown line dorsally and ventrally; corneas black and iridescent yellow. Antennules and antennae cream. Chelipeds cream and dark brown, colours largely obscured by setae. Pereiopods 2 and 3 cream with grey-brown bands proximally on dactyl, and at approximate midlength of propodus, carpus and merus. Setae pale grey.

Remarks. The specimen was collected from a shell of *Murex brevispinus* Lamarck.

The single representative of this species collected from the Northern Territory displays both paired male and female gonopores. The animal was not dissected to determine whether or not it possessed both testes and ovaries.

The Port Essington specimen agrees well with the descriptions and figures of *Troglopagurus jousseaumii* in Alcock (1905) and *Diogenes jousseaumei* in Forest (1952). Of greater concern is the validity of the genus *Troglopagurus* Henderson. I have accepted the argument of Forest (1952) that *Troglopagurus* and *Diogenes* are synonymous, with the small interocular plate of the former homologous with the larger interocular process of the latter. Certainly the specimen examined here has a small cuticular plate between the ocular peduncles, though it is much less developed than the equivalent structure in most other species of *Diogenes*. In contrast, Lewinsohn (1969) considered that these structures might not be homologous and retained the name *Troglopagurus*. Only detailed comparison of the two genera can resolve the problem, but at this stage it seems preferable to regard the two as synonymous with variation in rostral process development.

Habitat. The species was trawled from mud at 20 m depth.

Distribution. Red Sea east to India and northeast Australia.

Diogenes sp. A.

Material. NORTHERN TERRITORY: ♀, 3.5 mm, Hope Inlet, Shoal Bay, littoral, trawl, 25 August 1972; ♂, 3.1 mm, Orontes Reef west end, Port Essington, 14-17 m, 9 August 1986, WAM 147-87; ♂, 3.5 mm, Orontes Reef west end, Port Essington, 11 m, 10 August 1986, WAM 146-87.

Coloration. Shield cream or pale brown with darker brown patches especially later-

ally. Ocular peduncles cream with some brown ventrally; corneas black. Antennular and antennal peduncles cream or pale blue; flagella pale orange. Chelipeds cream and red-brown, tubercles on dactyl and propodus cream or white, carpus and merus distinctly mottled; cheliped colours largely obscured by setae. Pereiopods 2 and 3 mottled red-brown and cream; pereiopods 4 and 5 mostly cream with some pale brown. Setae pale yellow or brown.

Remarks. The Orontes Reef specimens were collected from shells of *Favartia* ? sp.

Though similar to *D. jousseaumei* in most respects, this species differs in several characters. In particular, the antennal acicles are more spinose (with 7-8 spines while the specimen of *D. jousseaumei* has 4), the dactyl of pereiopods 2 and 3 is a similar length to the propodus (while the dactyl is longer on *D. jousseaumei*), the dactyl and propodus of the left pereiopod 3 are laterally flattened with very distinct dorsal and ventral fringes of setae and the lateral surface is naked, the ocular peduncles fail to reach the base of the terminal antennular segment (while those of *D. jousseaumei* slightly exceed the base), and the colours differ slightly as can be inferred from the respective colour notes. In addition, the interocular plate is obsolete on *Diogenes* sp. A and comprises only a minute piece of cuticle with a tuft of setae. This condition is more typical of that ascribed to *Troglopagurus*, further confusing the status of that genus.

Habitat. Collected from soft substrates, littoral to at least 17 m depth.

Dardanus setifer (Milne Edwards)

Pagurus setifer Milne Edwards, 1836: 274; Alcock 1905: 83, Pl. 8 Fig. 3; Barnard 1950: 426, Fig. 79d; Fize and Serène 1955: 182, Figs 27 A,B, 28, Pl. 5 Figs 4-8.

Pagurus sculptipes Stimpson, 1858: 246.

Pagurus pavementatus Hilgendorf, 1878: 816, Pl. 3 Figs 1-5.

Dardanus setifer - Gordan 1956: 316; Ball and Haig 1972: 103; Khan and Natarajan 1984: 10, Fig. 7.

Material. NORTHERN TERRITORY: 2 ♂, 9.2 mm, 4.3 mm, ♀, 6.1 mm, Orontes Reef west end, Port Essington, 14-17 m, 9 August 1986, WAM 164-87; 2 ♂, 3.9 mm, 3.6 mm, 2 ♀, 5.9 mm, 1.9 mm, Orontes Reef

west end, 11 m, 10 August 1986, WAM 143-87; ♂, 2.6 mm, Orontes Reef west end, 12 m, 13 August 1986, WAM 142-87.

Coloration. Shield pale brown with darker, redder patches and minute vibrant blue spots around setal pores; some small specimens with large blue-purple patches medially. Ocular peduncles pale-brown, corneas black with blue tinges. Antennules and antennae bright yellow, antennal acicles brown. Dactyl of left cheliped maroon with darker corneous spines dorsally, paler tubercles ventrally. Propodus with fixed finger maroon, palm paler maroon or red-brown; paler tubercles ventrally. Carpus brown and red-brown with large violet or blue-violet patch dorsomesially. Merus brown with paler tubercles. Right cheliped with dactyl and propodus red-brown with paler patches. Carpus and merus like left cheliped. Pereiopods 2 and 3 with dactyl red-brown with paler brown patches; pale orange or cream near tips. Propodus red-brown, paler proximally and distally. Carpus brown and red-brown, with violet patch on dorsomesial surface. Merus red-brown and brown with paler tubercles. Setae red and pale yellow or cream. Small specimens more speckled, larger areas of white or cream.

Remarks. *D. setifer* was collected from shells of *Mancinella mancinella* (Linnaeus), *Cerithium novaehollandiae* A. Adams and *Chicoreus microphyllus* (Lamarck).

Fize and Serène (1955) discussed at some length the differences between *D. crassimanus* (Milne Edwards) and *D. setifer*. The species are very similar and poorly distinguished by previous workers, including their author Milne Edwards (1836). Fize and Serène (1955) revised Alcock's (1905) description of *D. setifer* and distinguished that species from *D. crassimanus* by the presence on *D. setifer* of distinct fans of short setae around spines on the palm of the left chela and the short spines forming a 'palissade' along the lower margin of that chela. The Northern Territory specimens have the rosettes of short setae around the cheliped spines, but these spines are rather longer and more corneous than those illustrated by Fize and Serène (1955: Fig. 28 and Pl. 5 Fig. 6). The inner lower margin of the left chela of the Northern Territory animals is crenulate and resembles that of Fize and Serène's animals (Pl. 5 Fig. 7). The

shapes of the chelae are similar. Alcock's illustration of *D. setifer* (1905: Pl. 8, Fig. 3) shows the left chela bearing longer spines than those of Fize and Serène's specimens, hence resembling the Northern Territory specimens, but the left chela is more elongate in Alcock's figure. The present specimens key to *D. crassimanus* in Miyake (1978).

The definitive separation of *D. setifer* and *D. crassimanus* requires further consideration and, if possible, comparison of type material. As noted by Fize and Serène (1955) it is likely that the two species have been confused often in the past.

Habitat. Found at depths between 11 and 17 m, on a silt and sand substrate with scattered corals.

Distribution. From east Africa to Hong Kong and Australia, but owing to confusion with *D. crassimanus*, its precise distribution is uncertain.

Dardanus lagopodes (Forskål)

Cancer lagopodes Forskål, 1775: 93.

Pagurus sanguinolentus Quoy and Gaimard, 1824: 532, Pl. 79 Fig. 2; Alcock 1905: 169; Forest 1953: 559, Figs 12-14; Fize and Serène 1955: 166, Fig. 25, Pl. 4 Figs 4, 5.

Pagurus affinis Milne Edwards, 1836: 274; Alcock 1905: 169.

Pagurus euopsis Dana, 1852: 7; Dana 1855: Pl. 28 fig 6; Alcock 1905: 86, Pl. 9 Fig. 2; Grant and McCulloch 1906: 37; Barnard 1950: 427.

Pagurus depressus Heller, 1861: 22.

Dardanus hellerii Paul'son, 1875: 90, Pl. 12 Fig. 4 a-c.

Dardanus euopsis - Buitendijk 1937: 275; Gordan 1956: 314.

Dardanus affinis - Gordan 1956: 312.

Dardanus sanguinolentus - Gordan 1956: 315.

Dardanus lagopodes - Lewinsohn 1969: 32, Pl. 2 Figs 1, 2; Lee 1969: 50; Ball and Haig 1972: 92.

Material. NORTHERN TERRITORY: 2 ♂, 14.6 mm, 13.5 mm, 2 ♀, 10.1 mm (ovig.), 9.6 mm, Coral Bay, Port Essington, 4-6 m, coral and sand, 11 August 1986, WAM 169-87; ♂, 13.3 mm, Oxley Island, 80 km east of Port Essington, lower littoral, 19 October 1982.

Coloration. Shield grey-brown with dark red-brown patches especially anterolaterally. Ocular peduncles dorsally grey with yellow band at base of corneas; ventrally white. Corneas black. Antennular and antennal peduncles yellow with thin dorsal and ventral olive green lines; antennular flagella yellow or orange, antennal flagella yellow or pale green. Chelipeds with dactyl mottled red, brown, orange and grey; propodus red-orange on finger and most of palm, dorsally brown-grey; carpus red-brown with large grey-violet patch dorsally; merus red-brown and grey. Cheliped spines tipped with pale brown or cream. Pereiopods 2 and 3 red-brown mottled with flecks of pale violet; carpus mostly dark brown-maroon dorsally and similar patch on dorsal surface of merus. Setae red with cream tips.

Remarks. *D. lagopodes* was collected from shells of *Syrinx aruanus* (Linnaeus) and *Tectus pyramis* Born.

The Port Essington specimens, for which live coloration was recorded, can be assigned to the dark colour variety or form of Fize and Serène (1955) and Ball and Haig (1972).

Habitat. Lower littoral and shallow sublittoral waters of the Northern Territory.

Distribution. Red Sea and eastern Africa, to Australia, New Guinea, Japan and east to the Tuamotu Archipelago.

Family Paguridae

Spiropagurus spiriger (De Haan)

Pagurus spiriger De Haan, 1849: 206, Pl. 49 Fig. 2.

Spiropagurus spiriger - Stimpson 1858: 248; Henderson 1888: 72; Alcock 1905: 118, Pl. 13 Fig. 1; Gordan 1956: 341; Ball and Haig 1972: 104.

Material. NORTHERN TERRITORY: 2 ♂, 5.7 mm, 4.9 mm, 4 ♀, 5.6 mm-5.1 mm (2 ovig.), Darwin, 25-38 m, September 1965.

Coloration. No live material was collected.

Remarks. Alcock (1905) diagnosed, keyed and illustrated three varieties of *S. spiriger*, (*S. spiriger* var. *profundorum*, *S. s.* var. *spinosicarpis* and *S. s.* var. *lophomeris*) in addition to the nominotypical variety (for which he did not employ a subspecific name).

The present specimens key best to Alcock's *S. spiriger* but display long, regularly distributed setae on the antennal acicle which is not characteristic of the nominotypi-

cal variety. There are only two rows of spines on the carpus of chelipeds and the merus of pereiopods 2 and 3 is not distinctly carinate, hence, keying to neither *S. s. spinosicarpis* nor *S. s. lophomeris*. The Northern Territory specimens are somewhat intermediate between *S. spiriger* and *S. s. profundorum*, but the presence of rows of setae on the ocular peduncles best characterises *S. spiriger*. Lewinsohn (1982) noted that these varieties may warrant specific recognition.

Lewinsohn (1982) also erected a new Indo-West Pacific species, *S. finbriatus* contrasting this with *S. spiriger*. The Darwin material agrees well with Lewinsohn's description and figure of *S. spiriger*, with the exception that the specimens display larger spines on the carpus of the chelipeds, and as noted above, regularly distributed setae on the antennal acicles. The setation and spination of pereiopod 3 and telson shape concur with *S. spiriger* and are very distinct from *S. finbriatus*.

The Darwin specimens are therefore here designated *S. spiriger*, though several characters may warrant specific segregation from that taxon.

Habitat. Specimens in Northern Territory Museum collected from 25-38 m depth.

Distribution. Indian Ocean east to northern Australia, Japan and Admiralty Islands.

Pagurus kulkarnii Sankolli

Pagurus kulkarnii Sankolli, 1962: 136, Figs 1, 2.

Material. NORTHERN TERRITORY: ♂, 3.9 mm, East Point, Darwin, lower littoral, 8 January 1985, NTM Cr002745; 2 ♂, 2.8 mm, 2.2 mm, Dudley Point Reef, Darwin, lower littoral, silty reef flat pool, 18 October 1985, NTM Cr003373; ♂, 4.0 mm, Nightcliff, Darwin, 0.5 m, shore reef, 9 September 1975; 1 spec. (in shell), Hope Inlet, Shoal Bay, 25 August 1972; 2 ♂, 3.6 mm, 3.4 mm, ♀, 2.7 mm, Orontes Reef west end, Port Essington, 14-17 m, 9 August 1986, WAM 136-87; 9 specs. 3.9 mm-3.4 mm, Orontes Reef west end, 11 m, 10 August 1986, WAM 134-87; 18 specs. 4.4 mm-2.5 mm, Coral Bay, Port Essington, 4-6 m, sand and coral, 11 August 1986, WAM 135-87, 137-87; ♀, 2.1 mm, Coral Bay island, littoral, sand and rocks, 12 August 1986, WAM 140-87; ♂, 3.5 mm, 3 ♀, 3.9 mm, 3.6 mm,

3.4 mm (ovig.), Coral Bay near headland, 4 m, 12 August 1986, WAM 138-87.

Coloration. Shield cream with grey-brown patches, darker laterally often with blue tinge. Ocular peduncles with thin cream band proximally, then broad orange band, blue band, and orange band distally; corneas black with white spots. Ocular acicles cream and blue-grey. Antennular peduncles with penultimate segment pale blue proximally and orange distally, ultimate segment blue; flagella orange. Antennal peduncles cream with darker bands dorsally and ventrally; flagella faintly banded. Chelipeds predominantly cream; dactyl sometimes with faint pink tinge and some pale brown proximally; merus, carpus and propodus with several incomplete longitudinal stripes of brown. Pereiopods mostly cream or very pale brown; dactyl with stripes subproximally and often faint grey subdistal band; propodus with brown stripes at midlength and sometimes pale pink subdistal band; carpus with short brown stripes approximately at midlength; merus with several short brown stripes at midlength and sometimes faint pink band subdistally. Setae sparse, pale.

Remarks. The species was collected primarily from *Cronia uvellana* (Reeve) shells. Other shells utilised include *Mancinella mancinella* (Linnaeus), *Morula margariticola* (Broderip), *Cerithium* spp, *Mitra variabilis* Reeve and unidentified fasciolarids.

P. kulkarnii is very similar to *P. hedleyi* (Grant and McCulloch). Miers' (1884) description and figure of that species (as *Eupagurus kirkii*, not *E. kirkii* Filhol) do not permit definite distinguishing of the two species, and further comparison of these species is required to clarify specific differences. The Northern Territory material agrees in morphology and colour with Sankolli's description of *P. kulkarnii*, though Sankolli does not note the coloration of ocular and antennular peduncles.

The species has a prominent ventromesial flange or keel on the merus and carpus of the right cheliped of adult males. The flange is rather smaller in females and juveniles. The edge of the flange is either smooth or only slightly irregular in outline, in contrast to that of *Pagurus* sp. A. *Pagurus kulkarnii* can also be distinguished from other Northern Territory hermit crabs by the distinct blue and

orange coloration of the ocular and antennular peduncles.

Habitat. Littoral and sublittoral habitats to depths of at least 17 m; associated with soft silt sediments, sand, rock and sometimes coral reefs.

Distribution. This is the first record of the species outside of Indian waters.

Pagurus sp. A

Material. NORTHERN TERRITORY: ♂, 3.1 mm, Orontes Reef west end, Port Essington, 14-17 m, 9 August 1986, WAM 163-87; ♂, 4.4 mm, ♀, 3.7 mm, 1 very damaged specimen, Orontes Reef west end, Port Essington, 11 m, 10 August 1986, WAM 162-87.

Coloration. Shield cream with some green-brown patches. Ocular peduncles cream with short, green-brown stripes distally and subproximally; corneas black. Antennular peduncles cream with green-brown patch distally on penultimate segment; flagella orange. Antennal peduncles cream with slightly darker patches and darker lines along dorsal and ventral edges of ultimate segment; flagella faintly banded cream and green-brown. Chelipeds cream with incomplete longitudinal brown or green-brown stripes on merus, carpus and propodus. Pereiopods cream with short longitudinal stripes similar to *P. kulkarnii*. Setae pale grey or cream.

Remarks. This species was collected from shells of *Cronia uvellana* (Reeve).

The Northern Territory material, comprising only three usable specimens, could not be identified with certainty. The species closely resembles *P. kulkarnii* but differs slightly in coloration, especially of ocular and antennular peduncles, and in several morphological characters. Although both possess a distinct ventromesial ridge or flange on the carpus and merus of the right cheliped of males, that of *P. kulkarnii* is almost smooth while the flange of these specimens is ornamented with distinct spines. The ventrolateral edge of the carpus is also more spinose than that of *P. kulkarnii*. The dorsomedial surface of the propodus of chelipeds of *P. kulkarnii* lacks any distinct spination or ridge while these specimens display a low medial ridge, with some blunt spines, on right and left chelipeds. The setae of *P. kulkarnii* are sparsely distributed and simple while this species possesses plumose setae, which are

densely distributed along the medial cheliped ridge and along lateral and mesial margins.

The species keys to *P. conformis* de Haan in Miyake (1978). The description of that species in Ortmann (1892: 305) agrees quite well with the Northern Territory specimens except that he described the dactyl of pereopods as long and thin, while the dactyl of these specimens, and those of *P. kulkarnii*, is slightly shorter than the propodus and quite stout. Like *P. conformis*, *P. triserratus* (Ortmann) has a row of medial spines on the right cheliped but also has the dactyl of pereopods longer than the propodus and the right cheliped is almost devoid of setae.

I believe that further specimens are required for an accurate description of this probably new species.

Habitat. Sublittoral silt and sand habitats, with some coral, at depths between 11 m and 17 m.

Additional Northern Territory Species

Three species of *Dardanus* are represented in the NTM collection from localities other than Darwin and Port Essington:

1. One specimen of *D. hessii* (Miers) (NTM CR003529) has been collected from Cape Wessel, 650 km eastnortheast of Darwin, and three specimens were collected from the Arafura Sea (12°58'S, 132°10'E). The Cape Wessel specimen appears to have a regenerate right cheliped, but otherwise it is identical to the Arafura specimens with typical subequal chelipeds.
2. *D. pedunculatus* (Herbst) is represented by a specimen (NTM Cr002977) from north of the Wessel Islands, in the Arafura Sea.
3. A specimen (CP/76) very similar to *D. imbricatus* (Milne Edwards) lacks locality data. It closely resembles the specimen of *D. imbricatus* illustrated by Fize and Serène (1955: Fig. 35) however the ocular peduncles are longer than those figured and the imbricating tubercles on the left cheliped have prominent blunt medial spines, possibly indicating specific differences from that species.

DISCUSSION

The majority of the hermit crab species recorded here have extensive ranges over much of the Indo-West Pacific region. The

dominance of *Diogenes* and *Clibanarius* species is to be expected in tropical shallow waters, especially when associated with mud and sand flats, mangroves and soft bottomed sublittoral habitats. *Diogenes avarus* and *D. gardineri* are the commonest littoral hermit crabs, especially on open sand and mud flats. *Clibanarius longitarsus* is very common in mangrove forests and *C. taeniatus* on rocky platforms. Suspended sediment loads and consequently water turbidity are high in most waters and coral reef development is only patchy in Port Essington. These conditions may explain the apparent absence of *Calcinus* species, usually common inhabitants of shallow coral and rocky reefs.

Dardanus species are the largest marine hermits in Northern Territory waters. Several species (*D. imbricatus*, *D. hessii* and *D. pedunculatus*) appear to prefer deeper offshore areas.

Of the pagurids, *Pagurus kulkarnii* is the most common, occurring in a range of habitats and depths from the littoral to at least 17 m.

Coenobita spinosus is the only member of the Coenobitidae known to occur on the mainland of the Northern Territory and is also the most common coenobitid in Australia.

The diversity of hermit crabs collected from the Northern Territory is comparable to that noted for some other tropical areas of the West Pacific e.g. Lee (1969) recorded 22 species from Taiwan, and Ball and Haig (1972) recorded 19 species from eastern New Guinea (with an additional 11 species noted for New Guinea from historical reports). Fize and Serène (1955) recorded 29 species (and a further three possible species) from Vietnam.

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